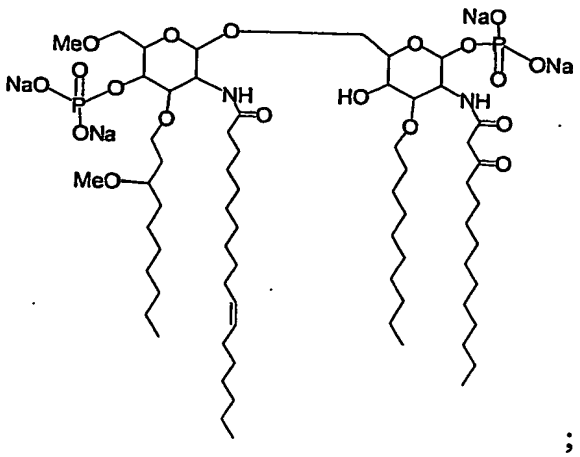
CLAIMS

What is claimed is:

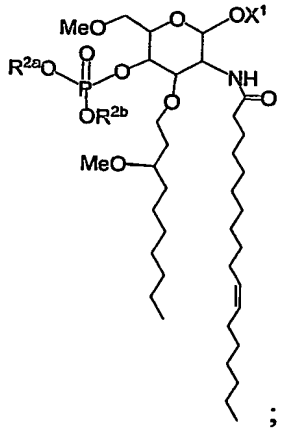
1. A method for preparing a compound having the structure:



;

said method comprising steps of:

(a) effecting glycosylation of a monosaccharide having the structure:

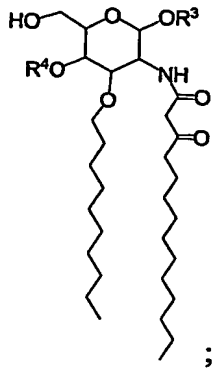


;

wherein OX^1 represents a suitable leaving group for effecting the glycosylation; and

R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl;

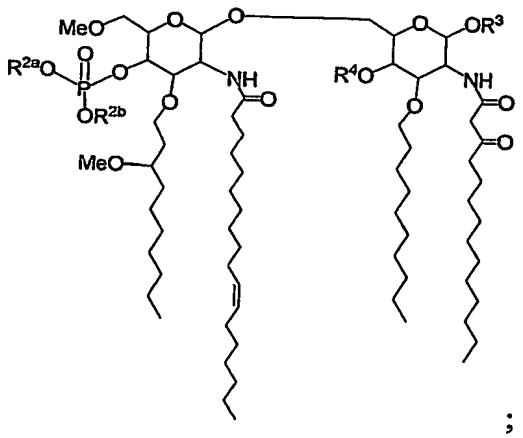
with a monosaccharide having the structure:



;

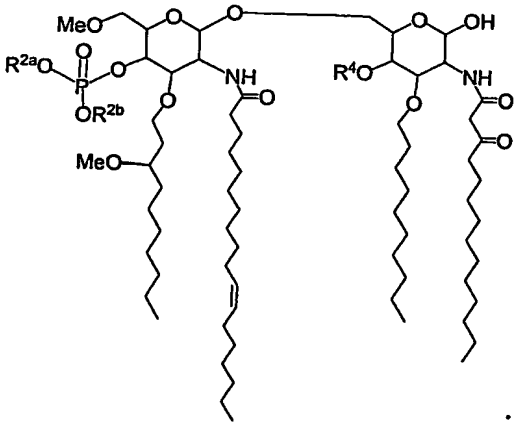
wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

under suitable conditions to effect formation of a disaccharide having the structure:



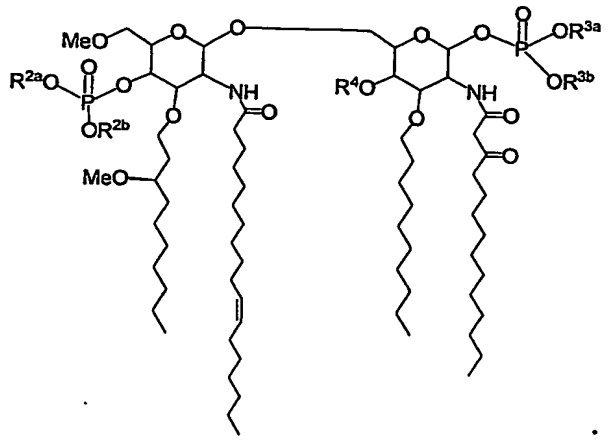
;

(b) deprotecting the disaccharide formed in step (a) under suitable conditions to effect formation of a partially deprotected disaccharide having the structure:



;

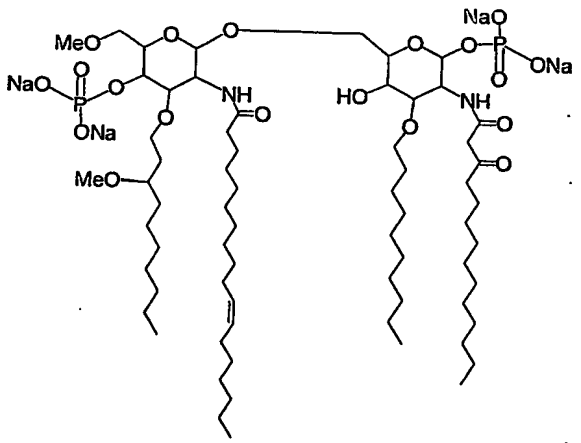
(c) reacting the partially deprotected disaccharide formed in step (b) with a suitable reagent under suitable conditions to effect formation of a diphosphorylated disaccharide having the structure:



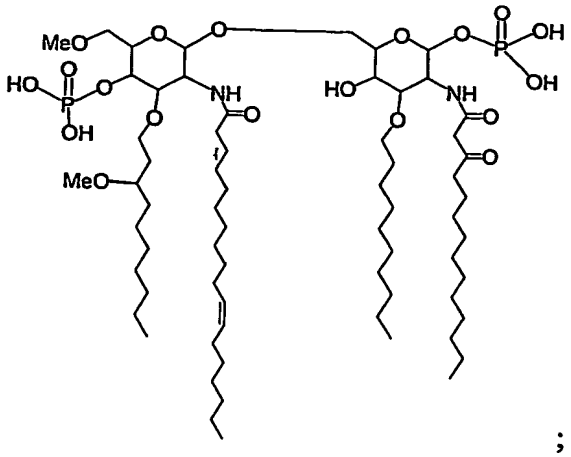
;

wherein R^{3a} and R^{3b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl; and

(d) treating the diphosphorylated disaccharide formed in step (c) with one or more suitable reagents under suitable conditions to effect formation of a disaccharide having the structure:

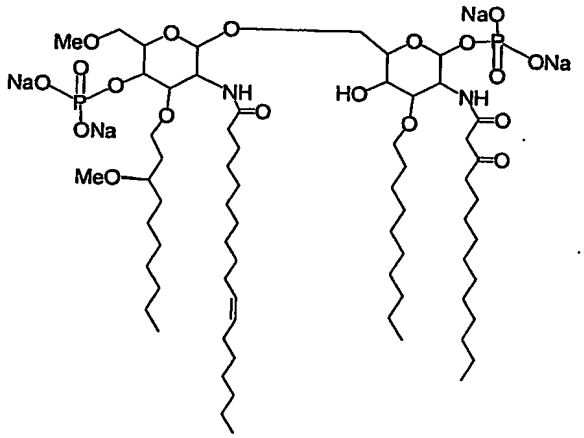


2. The method of claim 1 wherein the step of treating the diphosphorylated disaccharide formed in step (c) with one or more suitable reagents under suitable conditions leads to the formation of a compound having the structure:

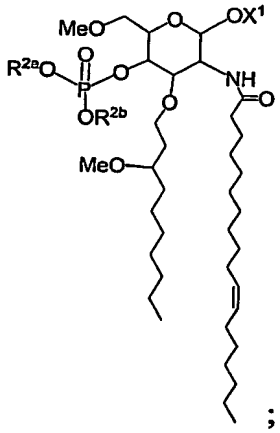


;

which is then purified to yield the corresponding tetra-sodium salt:



3. The method of claim 1 wherein the saccharide having the structure:



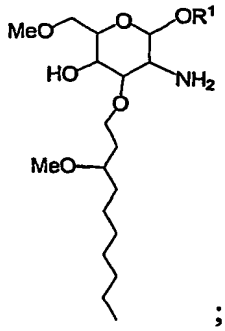
;

wherein OX^1 represents a suitable leaving group for effecting a glycosylation reaction; and

R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl;

is prepared by a process comprising steps of:

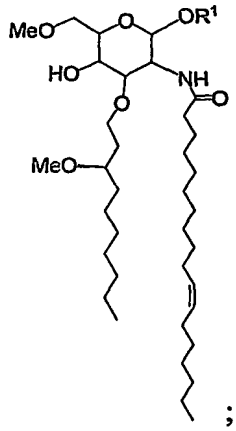
(a) reacting an amine having the structure:



;

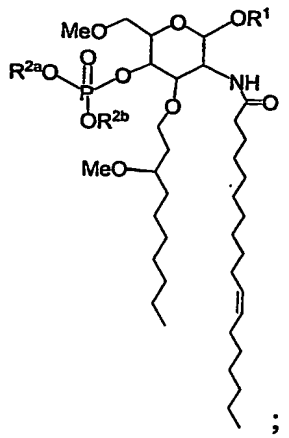
wherein R^1 is a suitable oxygen protecting group;

with a suitable vaccenoyl acid derivative to effect formation of an amide intermediate having the structure:



;

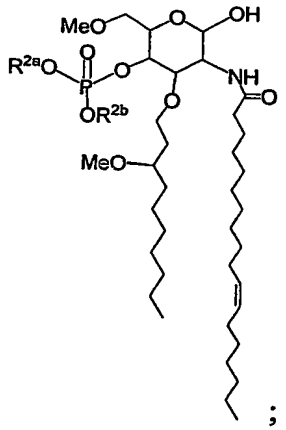
(b) reacting the amide intermediate formed in step (a) with a suitable reagent to effect formation of a phosphorylated saccharide having the structure:



;

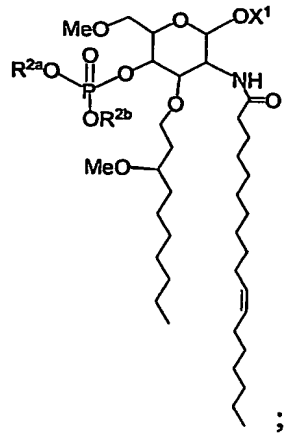
wherein R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl; and

(c) deprotecting the phosphorylated saccharide formed in step (b) under suitable conditions to effect formation of an alcohol intermediate having the structure:



; and

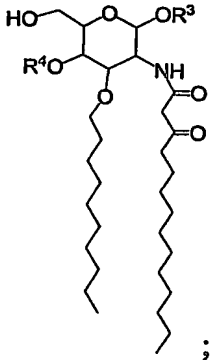
(d) reacting the alcohol intermediate formed in step (c) under suitable conditions to effect formation of a saccharide having the structure:



;

wherein OX^1 represents a suitable leaving group for effecting a glycosylation reaction.

4. The method of claim 1 wherein the saccharide having the structure:

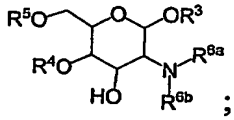


;

wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

is prepared by a process comprising steps of:

(a) reacting a saccharide having the structure:

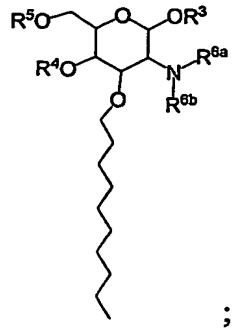


;

wherein R^3, R^4 and R^5 are each independently a suitable oxygen protecting group; wherein R^4 and R^5 , taken together, may form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; and

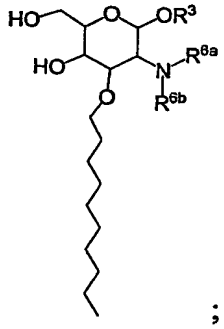
R^{6a} and R^{6b} are each independently hydrogen or a suitable nitrogen protecting group, or R^{6a} and R^{6b}, taken together, form a 5- or 6-membered heterocyclic ring; wherein R^{6a} and R^{6b} are not simultaneously hydrogen;

with a suitable decanyl derivative to effect formation of a decanyl ether having the structure:



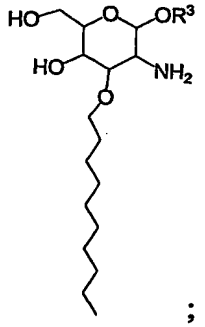
;

(b) deprotecting the decanyl ether formed in step (a) under suitable conditions to effect formation of a partially deprotected intermediate having the structure:



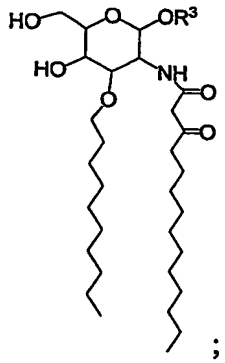
;

(c) deprotecting the amide moiety of the intermediate formed in step (b) under suitable conditions to give an amine intermediate having the structure:



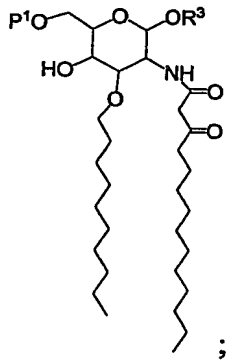
;

(d) reacting the amine intermediate formed in step (c) with a suitable 3-Oxo-tetradecanoic acid derivative under suitable conditions to effect formation of an amide intermediate having the structure:



;

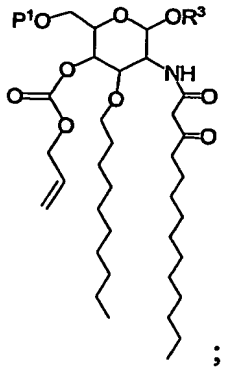
(e) selectively protecting the amide intermediate formed in step (d) under suitable conditions to effect formation of a protected intermediate having the structure:



;

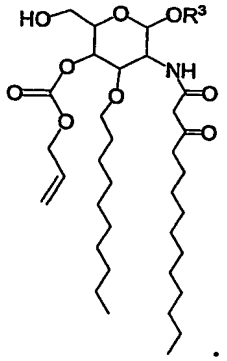
wherein P^1 is a suitable oxygen protecting group;

(f) reacting the protected intermediate formed in step (e) with a suitable reagent under suitable conditions to effect formation of a carbonic acid allyl ester intermediate having the structure:

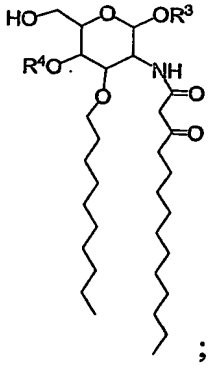


; and

(g) deprotecting the intermediate formed in step (f) under suitable conditions to effect formation of the saccharide having the structure:



5. The method of claim 1 wherein the saccharide having the structure:

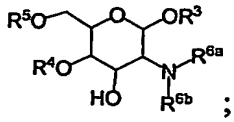


;

wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

is prepared by a process comprising steps of:

(a) reacting a saccharide having the structure:

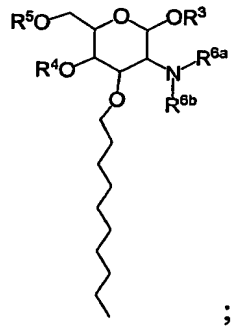


;

wherein R^3, R^4 and R^5 are each independently a suitable oxygen protecting group; wherein R^4 and R^5, taken together, may form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; and

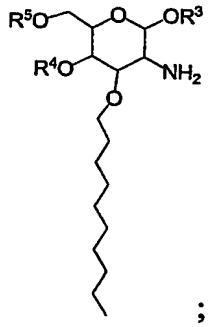
R^{6a} and R^{6b} are each independently hydrogen or a suitable nitrogen protecting group, or R^{6a} and R^{6b}, taken together, form a 5- or 6-membered heterocyclic ring; wherein R^{6a} and R^{6b} are not simultaneously hydrogen;

with a suitable decanyl derivative to effect formation of a decanyl ether having the structure:



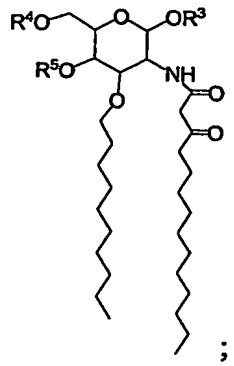
;

(b) deprotecting the amide moiety of the decanyl ether intermediate formed in step (a) under suitable conditions to effect formation of an amine having the structure:

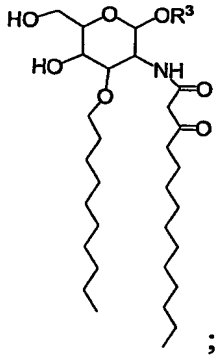


;

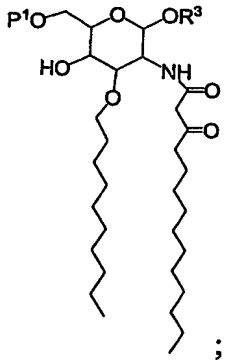
(c) reacting the amine intermediate formed in step (b) with a suitable 3-Oxo-tetradecanoic acid derivative under suitable conditions to effect formation of an amide intermediate having the structure:



(d) deprotecting the intermediate formed in step (c) under suitable conditions to effect formation of a partially deprotected amide intermediate having the structure:

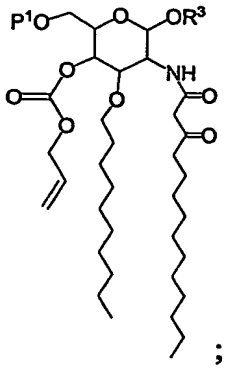


(e) selectively protecting the amide intermediate formed in step (d) under suitable conditions to effect formation of a protected intermediate having the structure:



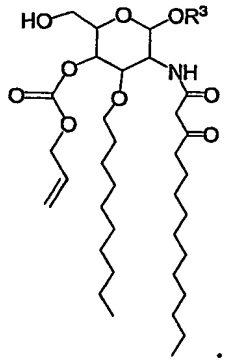
wherein P^1 is a suitable oxygen protecting group;

(f) reacting the protected intermediate formed in step (e) with a suitable reagent under suitable conditions to effect formation of a carbonic acid allyl ester intermediate having the structure:

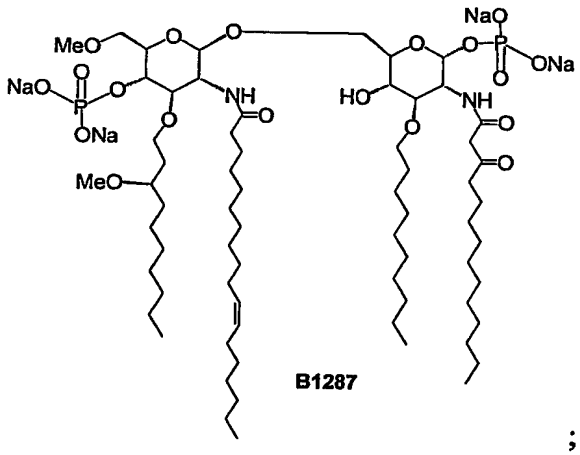


; and

(g) deprotecting the intermediate formed in step (f) under suitable conditions to effect formation of the saccharide having the structure:



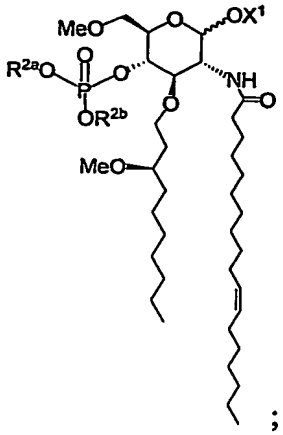
6. A method for for preparing a compound having the structure:



;

said method comprising steps of:

(a) effecting glycosylation of a monosaccharide having the structure:

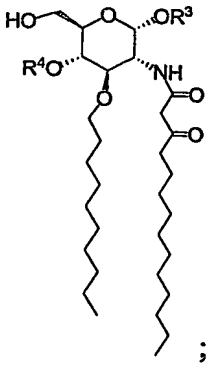


;

wherein OX^1 represents a suitable leaving group for effecting the glycosylation; and

R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl;

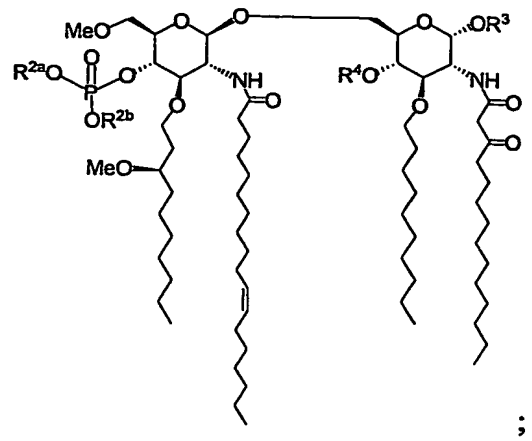
with a monosaccharide having the structure:



;

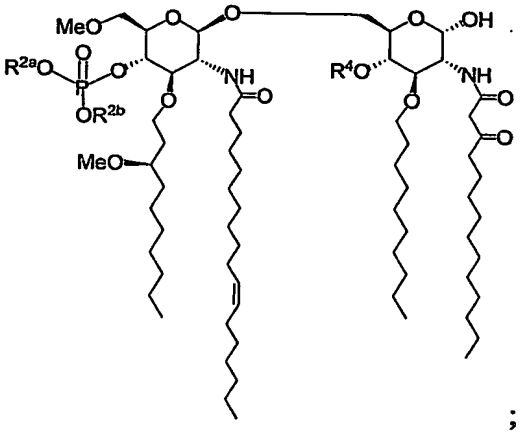
wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

under suitable conditions to effect formation of a disaccharide having the structure:



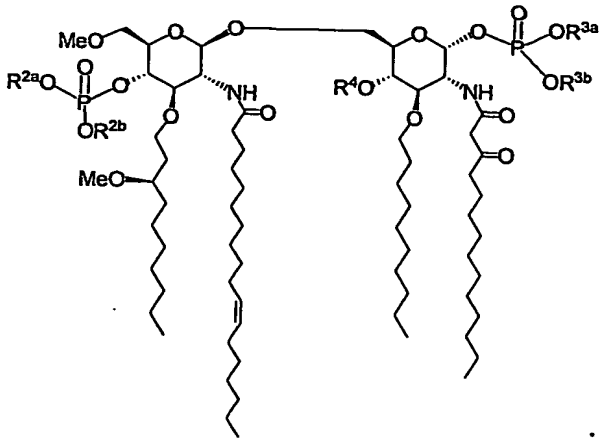
;

(b) deprotecting the disaccharide formed in step (a) under suitable conditions to effect formation of a partially deprotected disaccharide having the structure:



;

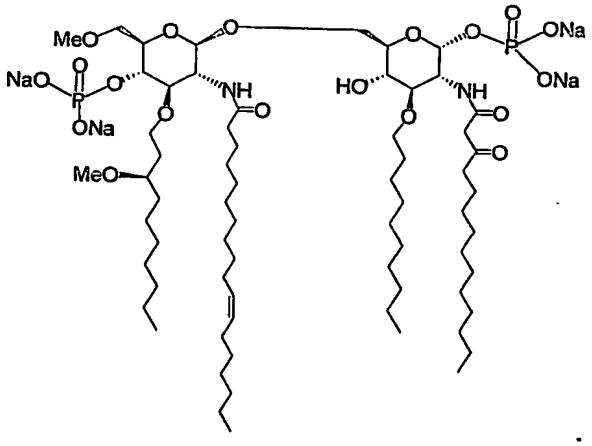
(c) reacting the partially deprotected disaccharide formed in step (b) with a suitable reagent under suitable conditions to effect formation of a diphosphorylated disaccharide having the structure:



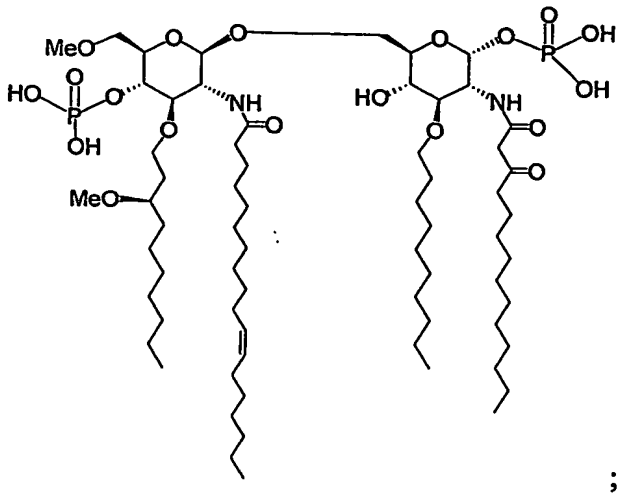
;

wherein R^{3a} and R^{3b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl; and

(d) treating the diphosphorylated disaccharide formed in step (c) with one or more suitable reagents under suitable conditions to effect formation of a disaccharide having the structure:

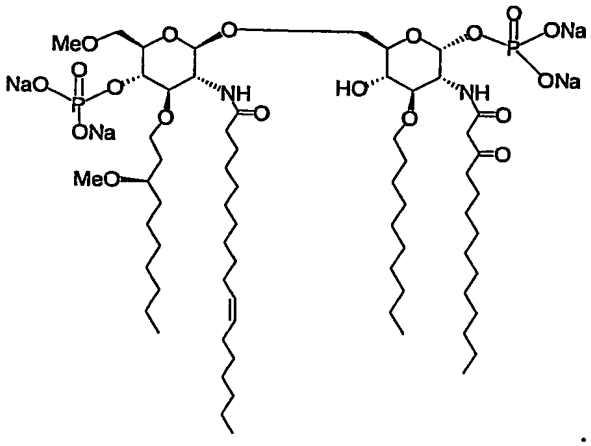


7. The method of claim 6 wherein the step of treating the diphosphorylated disaccharide formed in step (c) with one or more suitable reagents under suitable conditions leads to the formation of a compound having the structure:

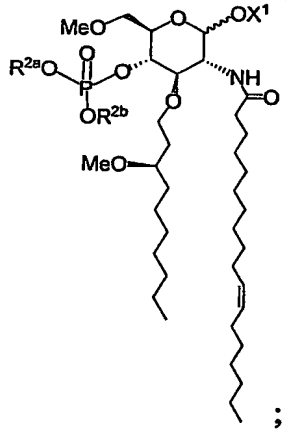


;

which is then purified to yield the corresponding tetra-sodium salt:



8. The method of claim 6 wherein the saccharide having the structure:



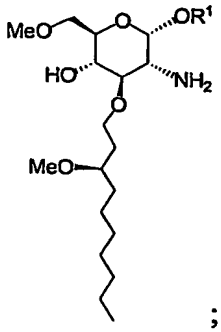
;

wherein OX^1 represents a suitable leaving group for effecting a glycosylation reaction; and

R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl;

is prepared by a process comprising steps of:

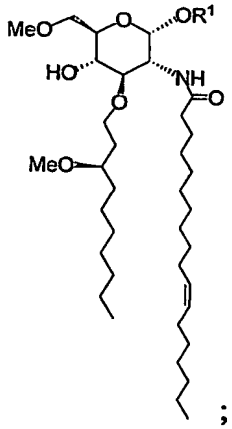
(a) reacting an amine having the structure:



;

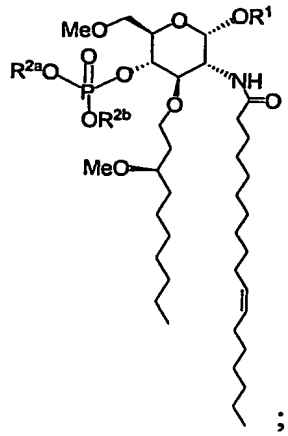
wherein R^1 is a suitable oxygen protecting group;

with a suitable vaccenoyl acid derivative to effect formation of an amide intermediate having the structure:



;

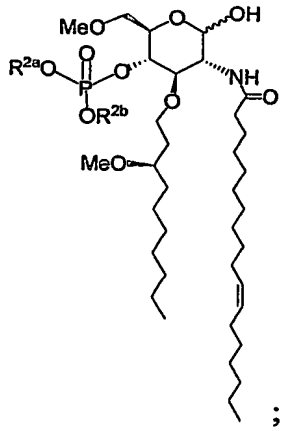
(b) reacting the amide intermediate formed in step (a) with a suitable reagent to effect formation of a phosphorylated saccharide having the structure:



;

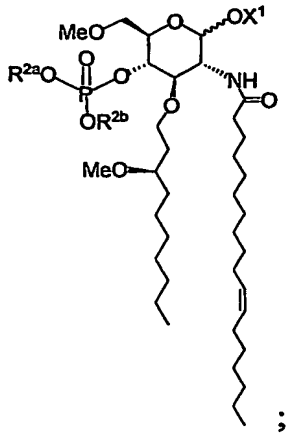
wherein R^{2a} and R^{2b} are each independently alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, aryl or heteroaryl; and

(c) deprotecting the phosphorylated saccharide formed in step (b) under suitable conditions to effect formation of an alcohol intermediate having the structure:



; and

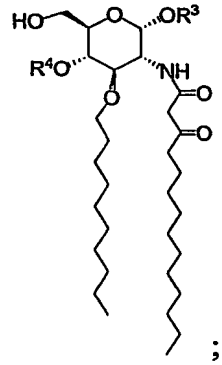
(d) reacting the alcohol intermediate formed in step (c) under suitable conditions to effect formation of a saccharide having the structure:



;

wherein OX^1 represents a suitable leaving group for effecting a glycosylation reaction.

9. The method of claim 6 wherein the saccharide having the structure:

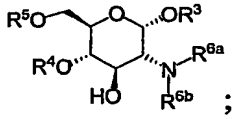


;

wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

is prepared by a process comprising steps of:

(a) reacting a saccharide having the structure:

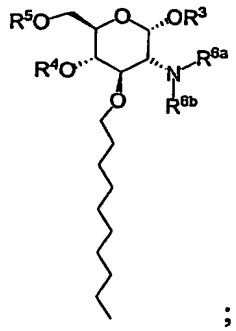


;

wherein R^3, R^4 and R^5 are each independently a suitable oxygen protecting group; wherein R^4 and R^5 , taken together, may form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; and

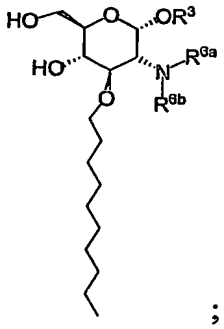
R^{6a} and R^{6b} are each independently hydrogen or a suitable nitrogen protecting group, or R^{6a} and R^{6b}, taken together, form a 5- or 6-membered heterocyclic ring; wherein R^{6a} and R^{6b} are not simultaneously hydrogen;

with a suitable decanyl derivative to effect formation of a decanyl ether having the structure:



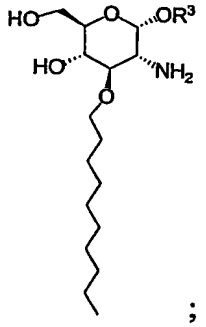
;

(b) deprotecting the decanyl ether formed in step (a) under suitable conditions to effect formation of a partially deprotected intermediate having the structure:



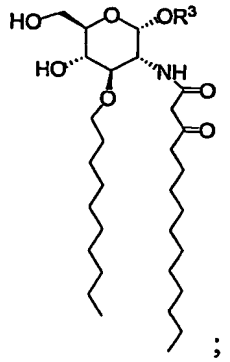
;

(c) deprotecting the amide moiety of the intermediate formed in step (b) under suitable conditions to give an amine intermediate having the structure:



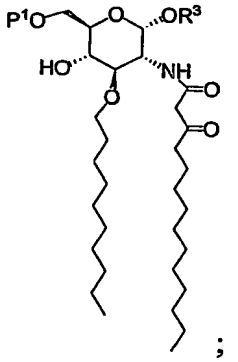
;

(d) reacting the amine intermediate formed in step (c) with a suitable 3-Oxo-tetradecanoic acid derivative under suitable conditions to effect formation of an amide intermediate having the structure:



;

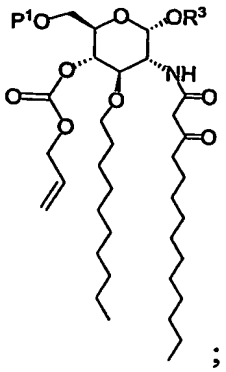
(e) selectively protecting the amide intermediate formed in step (d) under suitable conditions to effect formation of a protected intermediate having the structure:



;

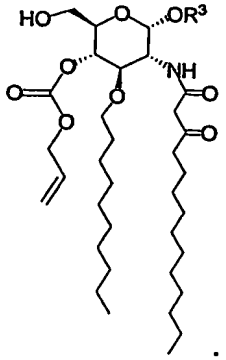
wherein P^1 is a suitable oxygen protecting group;

(f) reacting the protected intermediate formed in step (e) with a suitable reagent under suitable conditions to effect formation of a carbonic acid allyl ester intermediate having the structure:

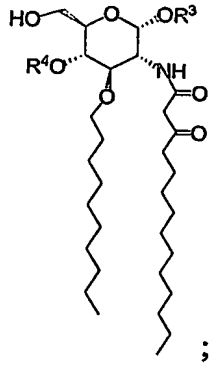


; and

(g) deprotecting the intermediate formed in step (f) under suitable conditions to effect formation of the saccharide having the structure:



10. The method of claim 6 wherein the saccharide having the structure:

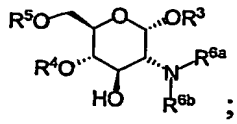


;

wherein R^3 and R^4 are each independently a suitable oxygen protecting group;

is prepared by a process comprising steps of:

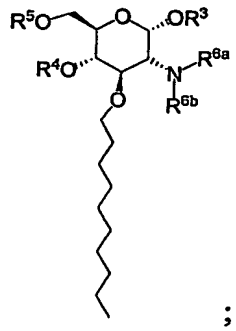
(a) reacting a saccharide having the structure:



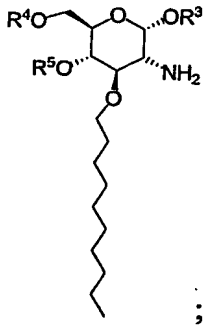
wherein R^3, R^4 and R^5 are each independently a suitable oxygen protecting group; wherein R^4 and R^5 , taken together, may form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; and

R^{6a} and R^{6b} are each independently hydrogen or a suitable nitrogen protecting group, or R^{6a} and R^{6b}, taken together, form a 5- or 6-membered heterocyclic ring; wherein R^{6a} and R^{6b} are not simultaneously hydrogen;

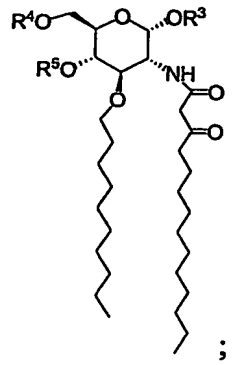
with a suitable decanyl derivative to effect formation of a decanyl ether having the structure:



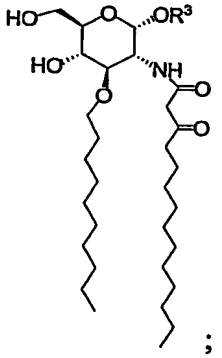
(b) deprotecting the amide moiety of the decanyl ether intermediate formed in step (a) under suitable conditions to effect formation of an amine having the structure:



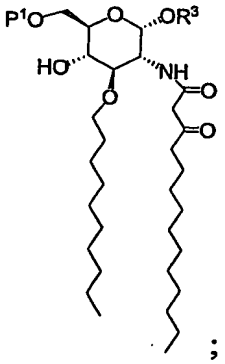
(c) reacting the amine intermediate formed in step (b) with a suitable 3-Oxo-tetradecanoic acid derivative under suitable conditions to effect formation of an amide intermediate having the structure:



(d) deprotecting the intermediate formed in step (c) under suitable conditions to effect formation of a partially deprotected amide intermediate having the structure:

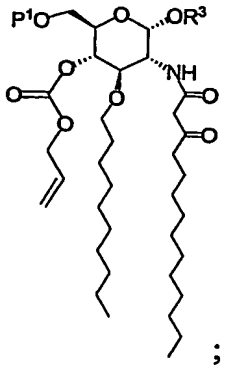


(e) selectively protecting the amide intermediate formed in step (d) under suitable conditions to effect formation of a protected intermediate having the structure:



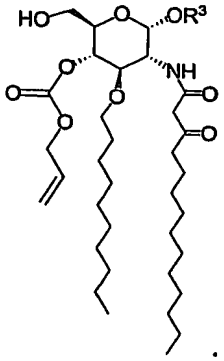
wherein P^1 is a suitable oxygen protecting group;

(f) reacting the protected intermediate formed in step (e) with a suitable reagent under suitable conditions to effect formation of a carbonic acid allyl ester intermediate having the structure:



; and

(g) deprotecting the intermediate formed in step (f) under suitable conditions to effect formation of the saccharide having the structure:



11. The method of claim 1 or 6 wherein X^1 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^{X1A}$, $-C(=S)R^{X1A}$, $-C(=NR^{X1A})R^{X1B}$, $-SO_2R^{X1A}$, wherein R^{X1A} and R^{X1B} are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl,

heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

12. The method of claim 1 or 6 wherein X^1 is $-C(=NR^{X1A})R^{X1B}$ or $-SO_2R^{X1A}$, wherein R^{X1A} and R^{X1B} are each independently hydrogen or an aliphatic, alicyclic, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

13. The method of claim 12 wherein X^1 is $-C(=NR^{X1A})R^{X1B}$ wherein R^{X1A} and R^{X1B} are each independently hydrogen or substituted or unsubstituted lower alkyl.

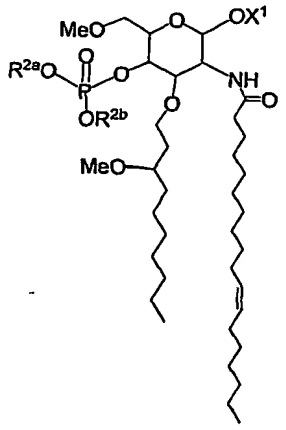
14. The method of claim 13 wherein R^{X1A} is hydrogen, R^{X1B} is $-CCl_3$, and X^1 is $-C(=NH)CCl_3$.

15. The method of claim 1 or 6 wherein X^1 is $-C(=NH)CCl_3$ and the glycosylation step (a) is conducted under strongly acidic conditions.

16. The method of claim 15 wherein the strongly acidic conditions comprise an alkanesulfonic acid.

17. The method of claim 16 wherein the alkanesulfonic acid is $MeSO_3H$ or $EtSO_3H$.

18. The method of claim 1 or 6 wherein in the glycosylation step (a), the monosaccharide having the structure:

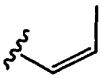
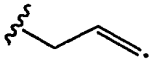


is used in excess.

19. The method of claim 18 wherein between 1.8 to about 2.0 equivalents of the monosaccharide are used.

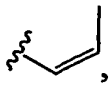
20. The method of claim 1 or 6 wherein R^3 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

21. The method of claim 20 wherein R^3 is a substituted or unsubstituted lower alkenyl moiety.

22. The method of claim 21 wherein R^3 is a moiety having the structure:  or  .

23. The method of claim 1 or 6 wherein the reaction conditions used in deprotection step (b) comprise a strong acid in a suitable solvent.

24. The method of claim 23 wherein the strong acid is HF and the solvent is acetonitrile.

25. The method of claim 1 or 6 wherein R^3 is a moiety having the structure:  , and the reaction conditions of deprotection step (b) comprise a strong acid in a suitable solvent.

26. The method of claim 25 wherein the strong acid is HF and the solvent is acetonitrile.

27. The method of claim 1 or 6 wherein the reagent in step (c) is a phosphorylating agent.

28. The method of claim 27 wherein the phosphorylating agent comprises bis(allyloxy)diisopropyl aminophosphine and an oxidizing agent.

29. The method of claim 28 wherein the oxidizing agent is Oxone.

30. The method of claim 1 or 6 wherein R^{2a}, R^{2b}, R^{3a} and R^{3b} are each independently a substituted or unsusbtituted alkenyl moiety.

31. The method of claim 30 wherein R^{2a}, R^{2b}, R^{3a} and R^{3b} are each allyl.

32. The method of claim 1 or 6 wherein R^4 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

33. The method of claim 32 wherein R^4 is $-C(=O)OR^A$, wherein R^A is substituted or unsubstituted alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl.

34. The method of claim 32 wherein R^4 is $-C(=O)OR^x$, wherein R^x is substituted or unsubstituted alkyl, alkenyl.

35. The method of claim 34 wherein R^x is allyl, and R^4 is $-C(=O)OCH_2CH=CH_2$.

36. The method of claim 1 or 6 wherein R^{2a}, R^{2b}, R^{3a} and R^{3b} are each allyl, R^4 is $-C(=O)OCH_2CH=CH_2$ and the deprotection conditions in step (d) comprise $Pd(PPH_3)$ in a suitable solvent.

37. The method of claim 36 wherein the deprotection conditions in step (d) further comprise triphenyl phosphine and acetic acid.

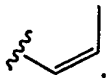
38. The method of claim 2 or 7 wherein step (i) comprises subjecting the deprotected disaccharide to ion exchange chromatography.

39. The method of claim 1 or 6 wherein step (d) comprises treating the diphosphorylated disaccharide formed in step (c) with $Pd(PPh_3)_4$ in the presence of PPh_3 and HOAc.

40. The method of claim 3 or 8 wherein R^1 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl,

heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, -C(=O)R^A or–ZR^A, wherein Z is –O-, -S-, -NR^B, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

41. The method of claim 40 wherein R^1 is a substituted or unsubstituted lower alkenyl moiety.

42. The method of claim 41 wherein R^1 is a moiety having the structure:  .

43. The method of claim 3 or 8 wherein the vaccenoyl acid derivative of step (a) is Δ-11-cis-vaccenoyl chloride.

44. The method of claim 3 or 8 wherein the vaccenoyl acid derivative of step (a) is Δ-11-cis-vaccenoyl chloride and the reaction conditions for reacting the amine with the vaccenoyl acid derivative in step (a) comprise a weak base.

45. The method of claim 44 wherein the weak base is aqueous $NaHCO_3$ or K_2CO_3.

46. The method of claim 3 or 8 wherein the reagent in step (b) is a phosphorylating agent.

47. The method of claim 3 or 8 wherein the reaction conditions in step (b) comprise bis(allyloxy)diisopropyl aminophosphine and an oxidizing agent.

48. The method of claim 47 wherein the oxidizing agent is Oxone.

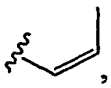
49. The method of claim 47 wherein the reaction conditions further comprise tetrazole.

50. The method of claim 3 or 8 wherein the reaction conditions in step (b) comprise bis(allyloxy)diisopropyl aminophosphine (DPP), pyridinium trifluoroacetate and an oxidizing agent.

51. The method of claim 50 wherein the oxidizing agent is hydrogen peroxide.

52. The method of claim 3 or 8 wherein R^{3a}, R^{3b}, R^{3a} and R^{3b} are each independently a substituted or unsusbtituted alkenyl moiety.

53. The method of claim 52 wherein R^{3a}, R^{3b}, R^{3a} and R^{3b} are each allyl.

54. The method of claim 3 or 8 wherein R^1 is a moiety having the structure:  , and the deprotection reaction in step (c) comprise strongly acidic conditions.

55. The method of claim 54 wherein the deprotection reaction comprise HCl in a suitable solvent.

56. The method of claim 55 wherein the solvent is THF or acetonitrile.

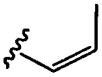
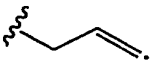
57. The method of claim 3 or 8 wherein X^1 is $-C(=NH)R^{X1B}$ wherein R^{X1B} is substituted or unsubstituted lower alkyl, and the step of reacting the alcohol intermediate in step (d) comprises reacting the alcohol intermediate with a moiety having the structure $R^{X1B}CN$ in the presence of a weak base.

58. The method of claim 57 wherein X^1 is $-C(=NH)CX_3$ wherein X represents a halogen atom and the weak base is K_2CO_3.

59. The method of claim 58 wherein X^1 is $-C(=NH)CCl_3$.

60. The method of claim 4 or 9 wherein R^3 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

61. The method of claim 60 wherein R^3 is a substituted or unsubstituted lower alkenyl moiety.

62. The method of claim 61 wherein R^3 is a moiety having the structure:  or  .

63. The method of claim 4 or 9 wherein R^4 and R^5 are each independently alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, or R^4 and R^5 , taken together, form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

64. The method of claim 63 wherein R^4 and R^5, taken together, form a substituted or unsubstituted 5- or 6-membered heterocyclic ring.

65. The method of claim 64 wherein R^4 and R^5, taken together, form a substituted or unsubstituted 1,3-dioxane moiety.

66. The method of claim 65 wherein R^4 and R^5, taken together, form a 2,2-dimethyl-1,3-dioxane moiety.

67. The method of claim 4 or 9 wherein R^{6a} and R^{6b} are each independently hydrogen, alkyl, alkenyl, $-C(=O)R^x$, $-C(=O)OR^x$, $-SR^x$, SO_2R^x, or R^{6a} and R^{6b}, taken together form a moiety having the structure $=CR^xR^y$, wherein R^{6a} and R^{6b} are not simultaneously hydrogen and R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

68. The method of claim 67 wherein R^{6a} is hydrogen and R^{6b} is $-C(=O)R^x$, wherein R^x is substituted or unsubstituted lower alkyl.

69. The method of claim 68 wherein R^{6a} is hydrogen and R^{6b} is $-C(=O)CX_3$, wherein X represents a halogen atom.

70. The method of claim 69 wherein R^{6a} is hydrogen and R^{6b} is $-C(=O)CF_3$.

71. The method of claim 4 or 9 wherein the decanyl derivative used in step (a) is a moiety having the structure $CH_3(CH_2)_9SO_2R^x$, wherein R^x is alkyl or aryl.

72. The method of claim 71 wherein R^x is methyl and the decanyl derivative is decanyl mesylate.

73. The method of claim 4 or 9 wherein the decanyl derivative is decanyl mesylate and the step of reacting the saccharide in step (a) comprises reacting the saccharide with NaH in a suitable solvent.

74. The method of claim 73 wherein the solvent is THF/NMP.

75. The method of claim 4 or 9 wherein the step of deprotecting the decanyl derivative in step (b) comprises subjecting the decanyl derivative to acidic conditions.

76. The method of claim 75 wherein the step of deprotecting the decanyl derivative comprises reacting the decanyl derivative with AcOH in H_2O.

77. The method of claim 4 or 9 wherein R^{6a} is hydrogen, R^{6b} is $-C(=O)CF_3$ and the step of deprotecting the amide moiety in step (c) comprises deprotecting the amide moiety in the presence of *t*BuOK in a suitable solvent, followed by treatment with KOH.

78. The method of claim 77 wherein the solvent is DMSO.

79. The method of claim 4 or 9 wherein the 3-Oxo-tetradecanoic acid derivative in step (d) is 3-Oxo-tetradecanoic acid itself and the reaction conditions comprise reacting the amine intermediate with 3-Oxo-tetradecanoic acid in the presence of EDC in NMP.

80. The method of claim 4 or 9 wherein P^1 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl,

alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

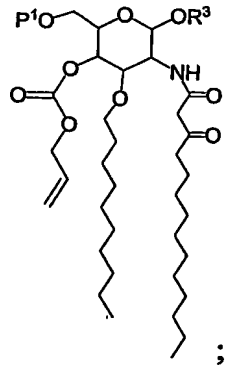
81. The method of claim 80 wherein P^1 is a silyl protecting group.

82. The method of claim 81 wherein P^1 is a trialkylsilyl protecting group.

83. The method of claim 4 or 9 wherein P^1 is *tert*-Butyldimethylsilyl (TBDMS) and the step of selectively protecting the amide intermediate in step (e) comprises reacting the amide intermediate formed in step (d) with *tert*-Butyldimethylsilyl chloride (TBDMSCl) in the presence of a base in a suitable solvent.

84. The method of claim 83 wherein the base is imidazole and the solvent is DMF.

85. The method of claim 4 or 9 wherein P^1 is *tert*-Butyldimethylsilyl (TBDMS) and the step of deprotecting the intermediate formed in step (f) comprises reacting the saccharide having the structure:



;

with HOAc in a suitable solvent system.

86. The method of claim 85 wherein the solvent system is *i*PrOH/H_2O.

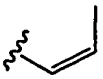
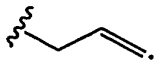
87. The method of claim 4 or 9 wherein the reagent used in step (f) to effect formation of a carbonic acid allyl ester intermediate comprises a combination of triphosgene and allyl alcohol.

88. The method of claim 4 or 9 wherein the step of reacting the protected intermediate formed in step (e) to form the carbonic acid allyl ester intermediate comprises (i) reacting the protected intermediate with triphosgene in the presence of a base in a suitable solvent, and (ii) trapping the phosgene adduct formed *in situ* with allyl alcohol under suitable conditions.

89. The method of claim 88 wherein the base is pyridine and the solvent is toluene.

90. The method of claim 5 or 10 wherein R^3 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

91. The method of claim 90 wherein R^3 is a substituted or unsubstituted lower alkenyl moiety.

92. The method of claim 91 wherein R^3 is a moiety having the structure:  or  .

93. The method of claim 5 or 10 wherein R^4 and R^5 are each independently alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, or R^4 and R^5 , taken together, form a substituted or unsubstituted 5- or 6-membered heterocyclic ring; wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

94. The method of claim 93 wherein R^4 and R^5, taken together, form a substituted or unsubstituted 5- or 6-membered heterocyclic ring.

95. The method of claim 94 wherein R^4 and R^5, taken together, form a substituted or unsubstituted 1,3-dioxane moiety.

96. The method of claim 95 wherein R^4 and R^5, taken together, form a 2,2-dimethyl-1,3-dioxane moiety.

97. The method of claim 5 or 10 wherein R^{6a} and R^{6b} are each independently hydrogen, alkyl, alkenyl, $-C(=O)R^x$, $-C(=O)OR^x$, $-SR^x$, SO_2R^x, or R^{6a} and R^{6b} , taken together form a moiety having the structure $=CR^xR^y$, wherein R^{6a} and R^{6b} are not simultaneously hydrogen and R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl,

heteroaliphatic, heteroalicyclic, aryl, heteroaryl, -C(=O)R^A or–ZR^A, wherein Z is –O-, -S-, -NR^B, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

98. The method of claim 97 wherein R^{6a} is hydrogen and R^{6b} is –C(=O)R^x, wherein R^x is substituted or unsubstituted lower alkyl.

99. The method of claim 98 wherein R^{6a} is hydrogen and R^{6b} is –C(=O)CX_3, wherein X represents a halogen atom.

100. The method of claim 99 wherein R^{6a} is hydrogen and R^{6b} is –C(=O)CF_3.

101. The method of claim 5 or 10 wherein the decanyl derivative used in step (a) is a moiety having the structure $CH_3(CH_2)_9SO_2R^x$, wherein R^x is alkyl or aryl.

102. The method of claim 101 wherein R^x is methyl and the decanyl derivative is decanyl mesylate.

103. The method of claim 5 or 10 wherein the decanyl derivative is decanyl mesylate and the step of reacting the saccharide in step (a) comprises reacting the saccharide with NaH in a suitable solvent.

104. The method of claim 103 wherein the solvent is THF/NMP.

105. The method of claim 5 or 10 wherein R^{6a} is hydrogen, R^{6b} is –C(=O)CF_3 and the step of deprotecting the amide moiety of the decanyl ether in step (b) comprises deprotecting the amide moiety in the presence of *t*BuOK in a suitable solvent, followed by treatment with KOH.

106. The method of claim 105 wherein the solvent is DMSO.

107. The method of claim 5 or 10 wherein the 3-Oxo-tetradecanoic acid derivative in step (c) is 3-Oxo-tetradecanoic acid itself and the reaction conditions comprise reacting the amine intermediate with 3-Oxo-tetradecanoic acid in the presence of EDC in NMP.

108. The method of claim 5 or 10 wherein the step of deprotecting the intermediate in step (d) comprises subjecting the intermediate to acidic conditions.

109. The method of claim 5 or 10 wherein the step of deprotecting the intermediate in step (d) comprises reacting the decanyl derivative with AcOH in H_2O.

110. The method of claim 5 or 10 wherein P^1 is alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, aryl, heteroaryl, silyl, $-C(=O)R^x$, $-C(=S)R^x$, $-C(=NR^x)R^y$, $-SO_2R^x$, wherein R^x and R^y are each independently hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl, heteroaryl, $-C(=O)R^A$ or $-ZR^A$, wherein Z is –O-, -S-, $-NR^B$, wherein each occurrence of R^A and R^B is independently hydrogen, or an alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, heterocycloalkyl, heterocycloalkenyl, heterocycloalkynyl, heteroaliphatic, heteroalicyclic, aryl or heteroaryl moiety.

111. The method of claim 110 wherein P^1 is a silyl protecting group.

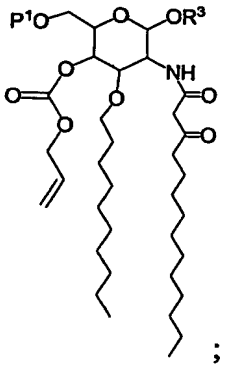
112. The method of claim 111 wherein P^1 is a trialkylsilyl protecting group.

113. The method of claim 5 or 10 wherein P^1 is *tert*-Butyldimethylsilyl (TBDMS) and the step of selectively protecting the amide intermediate in step (e) comprises

reacting the amide intermediate formed in step (d) with *tert*-Butyldimethylsilyl chloride (TBDMSCl) in the presence of a base in a suitable solvent.

114. The method of claim 113 wherein the base is imidazole and the solvent is DMF.

115. The method of claim 5 or 10 wherein P^1 is *tert*-Butyldimethylsilyl (TBDMS) and the step of deprotecting the intermediate formed in step (f) comprises reacting the saccharide having the structure:



;

with HOAc in a suitable solvent system.

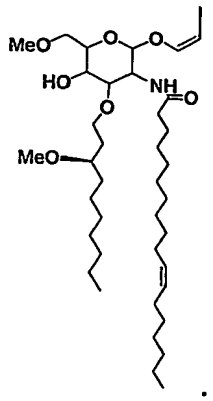
116. The method of claim 115 wherein the solvent system is *i*PrOH/H_2O.

117. The method of claim 5 or 10 wherein the reagent used in step (f) to effect formation of a carbonic acid allyl ester intermediate comprises a combination of triphosgene and allyl alcohol.

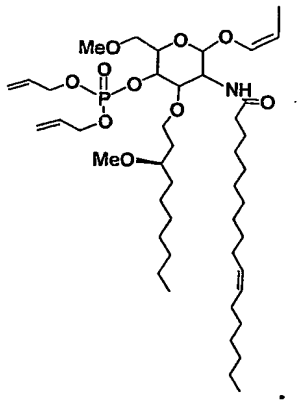
118. The method of claim 5 or 10 wherein the step of reacting the protected intermediate formed in step (e) to form the carbonic acid allyl ester intermediate comprises (i) reacting the protected intermediate with triphosgene in the presence of a base in a suitable solvent, and (ii) trapping the phosgene adduct formed *in situ* with allyl alcohol under suitable conditions.

119. The method of claim 118 wherein the base is pyridine and the solvent is toluene.

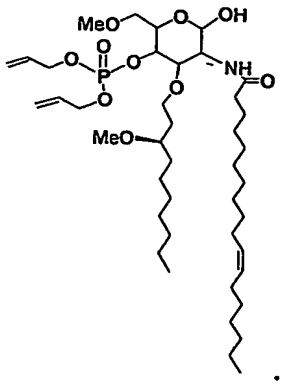
120. A compound having the structure:



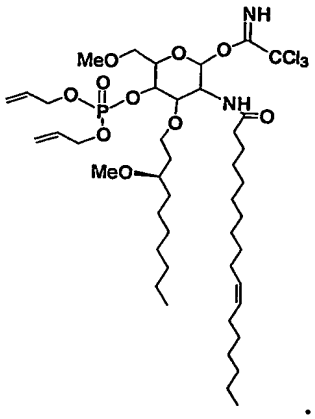
121. A compound having the structure:



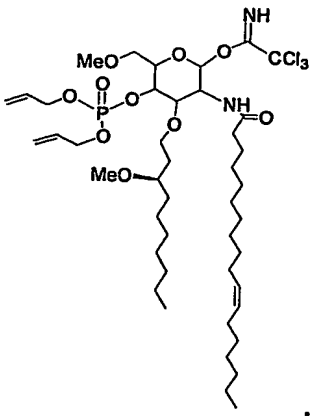
122. A compound having the structure:



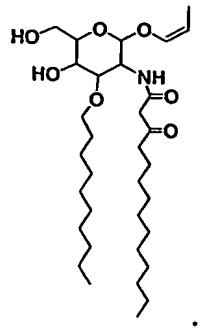
123. A compound having the structure:



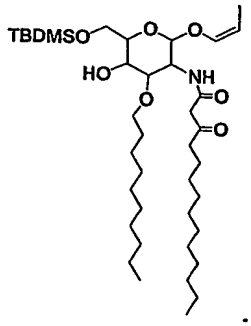
124. A compound having the structure:



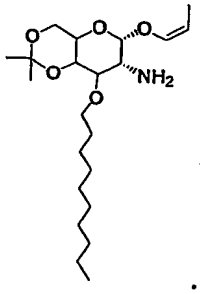
125. A compound having the structure:



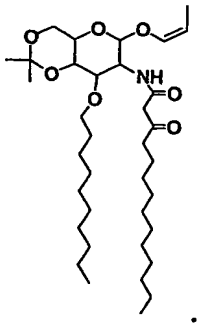
126. A compound having the structure:



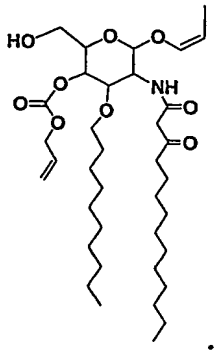
127. A compound having the structure:



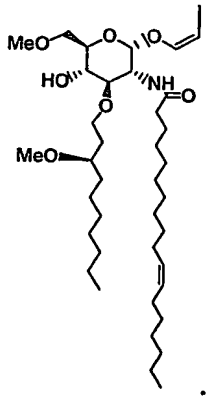
128. A compound having the structure:



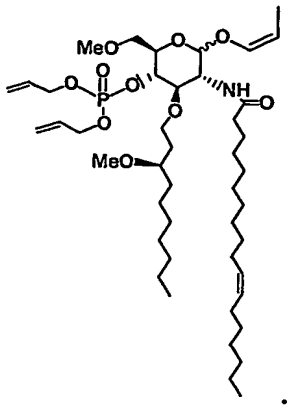
129. A compound having the structure:



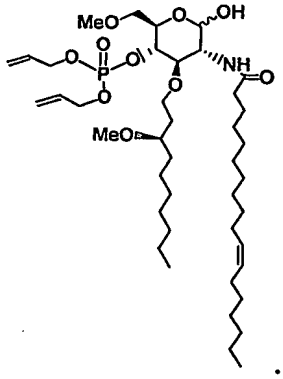
130. The compound of claim 120 having the structure:



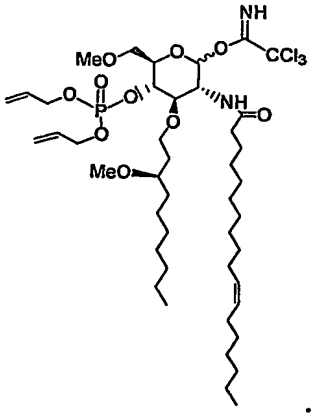
131. The compound of claim 121 having the structure:



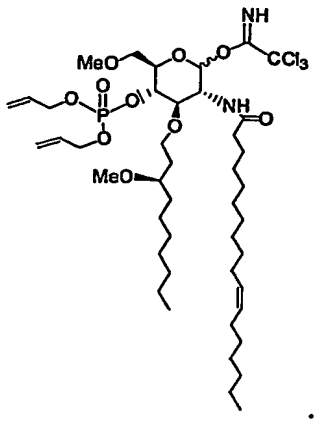
132. The compound of claim 122 having the structure:



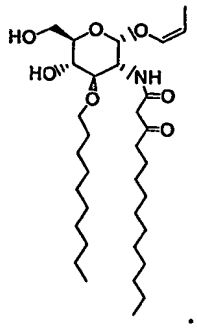
133. The compound of claim 123 having the structure:



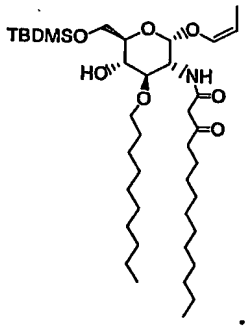
134. The compound of claim 124 having the structure:



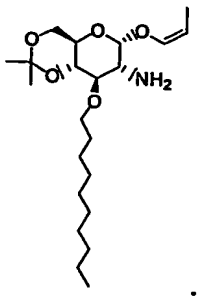
135. The compound of claim 125 having the structure:



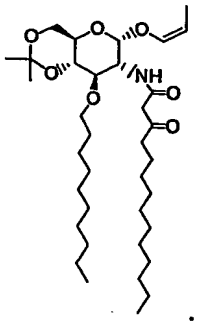
136. The compound of claim 126 having the structure:



137. The compound of claim 127 having the structure:



138. The compound of claim 128 having the structure:



139. The compound of claim 129 having the structure: